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Research Report

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Lakeside's Grimson: dry rolling is best

On a roll!

Analyzing the most cost-effective method to process feed

Barley is the principal feed grain used in commercial feedlots. In fact, Alberta livestock producers use over 1.4 million tonnes of it every year. It's an abundant crop, but some farmers doubt that low grade barley has the nutritional value needed for finishing cattle, and won't buy it regardless of the price. Conversely, others believe there are certain processing methods that can raise "inferior" barley to "acceptable" standards.

Tired of the controversy, Ray Grimson, manager of Lakeside Research in Brooks, decided to study the matter. With a $38,000 grant from Alberta Agriculture's "Farming For The Future," he set out to investigate the effects of three different barley weights on feedlot performance and on carcass quality. He wanted to know if steam flaking—a process used to soften and "fluff" the barley grain and make it more digestible—or dry rolling (which flattens the kernel) gave the best efficiency, and if either improved the digestibility of low volume weight barley.

Since barley must be processed before it can be digested by cattle, it was a pertinent question to ponder. Dry rolling, normally done at commercial feedlots, costs about $3 a tonne. And because of the high price of energy, steam flaking is worth about $15 a tonne. But Mr. Grimson's studies revealed that "steam processing of barley, regardless of the volume weight of the grain, does not improve feedlot performance or carcass quality of cattle over that achieved with dry rolling."

These tests were done with 192 yearlings divided into two groups, according to weight. The light steers, averaging 691 pounds, were kept for 111 days while the heavier steers (averaging 770 pounds at the onset of the test) were fed for 83 days before slaughter. Both groups of steers were weighed every 28 days. The dry matter intake for the cattle fed steam flaked barley tended to be higher than those fed the dry rolled grain, but the only difference this made to the average daily gain of the animals was seen in the first 27 days, when they gained weight 9.4% faster than the steers on the dry rolled diet. Dale Engstrom, nutritionist for Alberta Agriculture in Edmonton, says "the only advantage of steam flaking is that it gets the cattle on feed quicker. It may be useful for animals going on a short feed period before slaughter. Otherwise, I can't recommend the extra cost of steam flaking." Mr. Grimson agrees that steam flaking is less economical. "Dry rolling is the most cost-effective method of processing barley," he says, "and gives an equal performance value."

And Mr. Grimson made another important discovery: the volume weight of barley made no difference to the average daily gain of the steers. He used three volume weights of barley—light (less than 37 pounds per bushel [lb/bu]), medium (43–47 lb/bu) and heavy (48 lb/bu and over), which he fed both steer groups. He found that number one feed standard, at 46 lb/bu, will provide close to the optimal nutritional value of barley, while barley weighing more than that did not increase the average daily gain. However, the steers fed the light barley ate 9% more feed than the medium barley group, and 10.3% more than the heavy barley group. Says Mr. Grimson: "The only difference between the various bushel weights was in the feed conversion rate. The average daily gain was not affected because the cattle would compensate by eating more or less feed. Here it is the feed efficiency that is important; you need to use more of the light barley to get the same results."

INSIDE:
Best bet for barley

Counting sheep

A Magrath producer tries a super breed

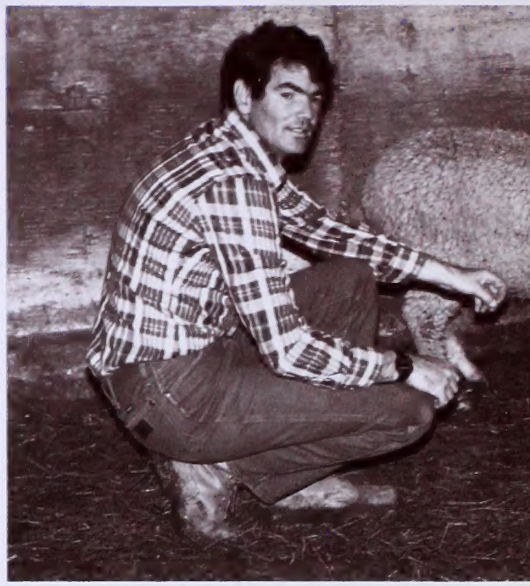
John Balderson's family has been raising sheep in the Magrath area for four generations. Like most Alberta sheep producers, the Baldersons bred range breeds such as the Rambouillet, Columbia, Suffolk and Dorset, which produce one or two lambs a year. Then three years ago, market prices for lamb dropped to 45 cents a pound (they have since risen to 77 to 80 cents per pound live weight, according to Jim Coughlan, general manager of Lambco Packing in Innisfail). Mr. Balderson knew he would have to find a way to increase lamb production per ewe, or risk going out of business. So he sold 700 traditional breed sheep from his flock and used the money to invest in 100 animals of a new strain: "Polypay" sheep. With an $18,000 three-year grant from Alberta Agriculture's "Farming For The Future," Mr. Balderson is testing the Polypay breed under a system of "accelerated lambing."

Polypay ("poly" for *many*, "pay" for *pay-off*) is a new crossbreed developed in 1969 at the Dubois Experimental Sheep Station in Idaho. It's a cross between the Dorset and the Targhee, and the Finnish Landrace (a breed known for having multiple births) and the Rambouillet. Polypays are so prolific, the Dubois station claims, that each ewe is capable of being bred twice a year and producing three to four lambs. Says Mr. Balderson: "That's nearly double what you get with traditional breeds."

Polypays will naturally breed year round, except in April and May. Ovulation in ewes is "phototrophic," and will not occur unless the light (whether natural or artificial) is reduced to six hours per day. Furthermore, a fertilized egg will not implant in a Polypay ewe's womb if the temperature is above 70 degrees Farenheit. So Mr. Balderson has been experimenting with light and temperature control to increase his lamb production. Another technique he's testing is to reintroduce the rams to ewes that fail to become pregnant on the first breeding attempt. If this is done within the month, the possibilities are very good that the ewe will become pregnant, give birth and become available for the second breeding. Mr. Balderson does not use hormones to induce breeding.

This producer sees the Polypay as "an essential breakthrough in the sheep industry. The consumer can purchase fresh Alberta lamb every two months, year round. And producers would no longer be subject to low market prices which occur every spring when the market is flooded." John Knapp, sheep specialist for Alberta Agriculture in Airdrie, is equally enthusiastic about the Polypay's performance. "They have enormous potential," he says. "With the economic conditions the way they are in Alberta, the rancher needs at least a 200% crop (two lambs per ewe per year). He can get that with the Polypays. They have a long breeding season and perpetually hold their breed."

Polypays were bred specifically for their multiple birth features, and were not



John and h

Best bet for barley

An Airdrie firm declares greenfeed the winner

Drought can stunt a barley crop, causing mature heads to develop on short stalks. Heavy rains in the late summer initiate a second growth, resulting in long stalks topped by immature heads. The potential for frost makes it risky to wait for the second growth to mature before harvesting. So with a $30,000 grant from Alberta Agriculture's "Farming For The Future," Ben Thorlakson of Thorlakson's Feedyard Ltd. in Airdrie is comparing the market and nutritional value of mixed maturity barley as grain, bagged silage, and greenfeed. These results will provide a cost and nutritive analysis for each of these products to determine which provides the best value to the producer, and hopefully reduce their losses in years of bad weather.

Mr. Thorlakson's test field consisted of 160 acres divided into four units. The first two were harvested, and the grain from each separated into two categories. One was barley and straw that had been swathed and allowed to dry in the sun before combining—thus "dry barley"—and the other was barley and straw that had been swathed, then combined immediately ("high moisture barley"). Though straw is not always used as a feed, it was added because it contained many of the mature heads on short stalks that the combine missed. The other two units were either harvested as silage or baled as greenfeed.

The final results are being tabulated this month. But Helen Finken, a research associate at Thorlakson's Feedyard, says "unofficially, greenfeed seems like the way to go. Farmers are already set up for it, it's easy to use bales, and it's the most efficient way to get the stuff off the field." Unless a farm is already equipped to use silage, it can be costly to buy the storage bags or build a silo. The dry barley, for its part, was found to be marketable, but bearing a very low bushel weight. And a lot was missed by the combine, because the stalks were so short.

Rick Corbett, a nutritionist at Alberta Agriculture's Animal Industry Division in Edmonton, agrees that a silage operation has a high initial cost, but he says it does have many advantages over greenfeed bales. "You'll get more of the crop off the field," he says, "and retain more of the good part of the plant. Harvest losses will be lower." The leaves of the plants contain most of the available nutrients, so every time a crop is processed and baled some nutrients are lost. Mr. Corbett observes: "It's not just dust, but dollars you see blowing around during baling." Silage has another advantage in that it can be stored even during rainy weather.

But Mr. Corbett has a strong warning for those who intend to use a damaged crop as feed. "Anytime a crop undergoes drought or frost," he says, "there is a risk of high nitrate levels." Plant roots collect nitrates from the soil which are then converted to energy by the plant's leaves. If the upper crop is damaged, there is a chance that the nitrates won't be converted, but will collect in the leaves. These nitrates are toxic to cattle and sheep, and death could occur only a few hours after consumption. Says Mr. Corbett: "It's well worth a few bucks to have a damaged crop tested for nitrate levels as it goes into the silo."

Of course, the real value of feed depends on the cattle. Feed that is easily digested produces more meat and less manure, which means less waste and higher profits to the producer. At the Thorlakson's Feedyard 180 calves were divided into four groups and given nutritionally equivalent rations of the four barley diets. Ms. Finken says, "There was little difference in weight gain over the 90 days." A fecal collection was taken from five steers in each group and sent to Alberta Agriculture for analysis, which is still taking place. From these samples the digestibility and the nutritional value of each type of feed can be delivered.

Agri

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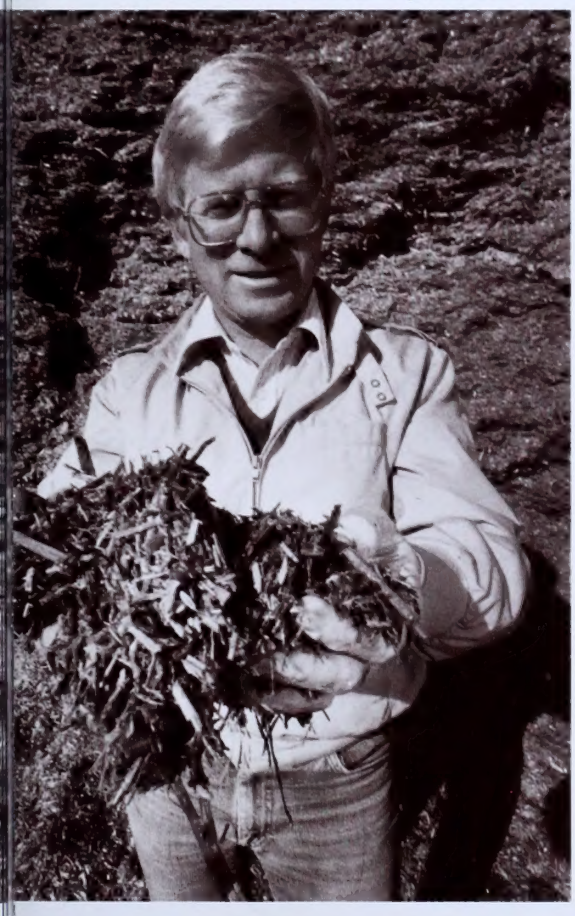
Poay sheep

thought to be a good "rate of gain" animal. But Mr. Balderson has had some of his sheep tested at the Olds Ram Test Station and says "as far as weight and carcass grades go, Polypays are equal to white-faced breeds." Nor are they more fragile than Alberta sheep. In the first year Mr. Balderson ran them with his family's flock, and sheared the Polypays along with the rest. "I shear on December 15, which is sometimes as cold as minus 20 degrees, and haven't had any problems. The winter in Idaho is similar to ours."

essman Thorlakson and his research product



FARMING FOR THE FUTURE

This month it was my very great pleasure to transfer 160 research reports from our Research Division office to the departmental library in the J.G. O'Donoghue Building in Edmonton. These reports, which document the results of research projects supported by "Farming For The Future," will be shelved in the library where producers, department staff and researchers will have access to them. I am confident that the reports will serve as a vital source of knowledge about agriculture in Alberta. These reports will also be listed on the *scitech* system, a microfiche catalogue of materials.

This collection represents only a portion of the research efforts of over 300 scientists funded by "Farming For The Future" to provide answers and alternatives that will work on Alberta farms and ranches. Many of the results reported are already being applied as new seed varieties, animal breeds and production techniques.

These reports and the other publications of the department, including the *Research Report*, various magazine inserts and mail-outs, are one key part of Alberta Agriculture's technology transfer strategy. The other components of the strategy involve our highly motivated field staff, informing producers of new developments, and the On-Farm Demonstration Program, which allows farmers and ranchers to actually see the results of research on their neighbour's field.

I hope that many of you will be able to utilize the new report collection. If you are unable to come to the library personally, please contact your district agriculturist regarding any report in which you have particular interest. Or, you may wish to contact the library directly, at:

Alberta Agriculture Library
J.G. O'Donoghue Building
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T6H 5T6
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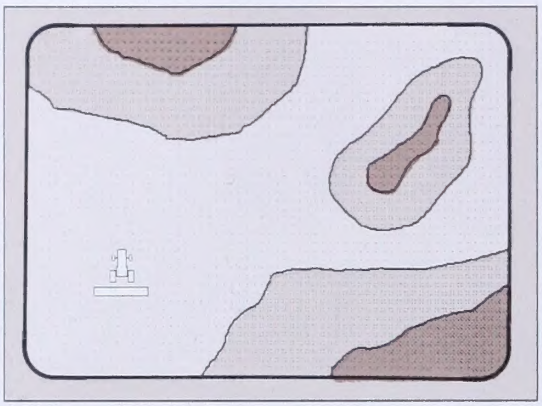
Know your fields better

Computers help compensate for irregular conditions

One of the unfortunate facts of agriculture is that perfect fields do not exist. An ideal plot would be flat, have uniform soil conditions that would grow a uniform crop and have no more than a very small, uniform weed problem. In reality, however, a field normally has high and low spots, varying soil conditions and scattered pockets of weeds. So James Baker, operations manager for Baker Electronics in Edmonton, is working with a $44,000 grant from Alberta Agriculture's "Farming For The Future" to develop a computer system to help farmers deal with fertilizer, herbicide and seed applications.

The computer will be programmed according to the various soil nutrient levels in a field, and will display a map showing areas requiring more or less chemical or seed. A sprayer monitor, already developed by Mr. Baker, will be placed in the tractor to allow spray rates to be adjusted from inside the cab. Sensors for assessing crop yield and soil moisture content will be attached to the tractor and this information will also be mapped out by the computer. But before all this electronic wizardry can come about, a system to determine exactly where the tractor is in the field must be developed.

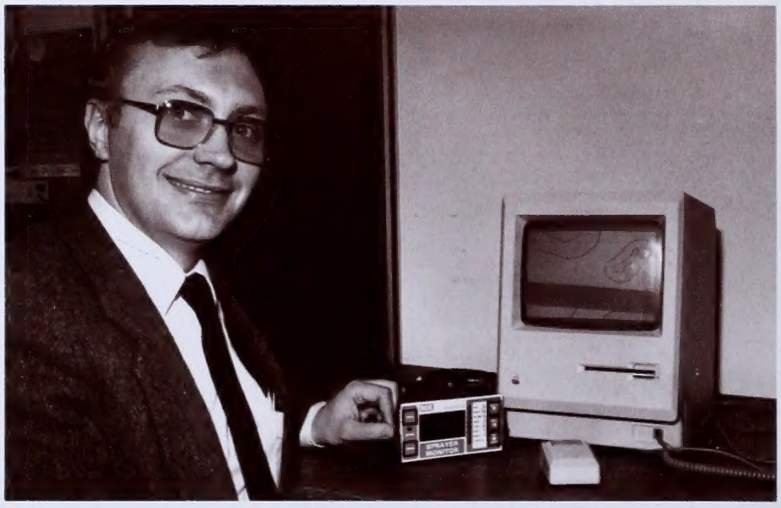
To achieve this end, Mr. Baker plans to use a "radio signal triangulation technique." Low frequency radio wave signals will be transmitted from a tractor-mounted directional rotating antenna to three beacons positioned on high ground on the perimeters of the field. By analyzing the angles between the beacons and the tractor, the computer can pinpoint the machine's location and direction. A grid on the computer's video display terminal (VDT) will show the farmer where he has crossed into a zone needing a different application rate. Mr. Baker says his intention "is to provide a graphics display similar to the one used on home computers, to show a map of the field and the tractor location. A zoom feature will allow each section of the field to be magnified two to eight times to examine problem areas, to show the number of laps completed and areas that might have been missed."



Other food producers are also studying this technology. Jeremy Leonard, Assistant Professor of Agricultural Engineering at the University of Alberta, has just returned from visiting the universities of Tasmania and Melbourne in Australia, where researchers are working on a system which they think "will locate a tractor to within a couple of centimetres." A similar system with emphasis on automatic tractor guidance has already been developed by Dr. Ron Palmer at the University of Regina. "But the problem with other systems," says Mr. Baker, "is that the electronics are complicated, expensive and require high frequency signals. We are not concerned with automatic tractor guidance. We just want to be able to locate the tractor in the field to allow the operator to adjust his chemical application according to the soil conditions. We plan to use a low frequency signal that interfaces directly with microprocessors. It also looks as though the beacons won't have to be powered, which again means a cost saving." The projected retail price of Mr. Baker's system is $5,000 to $7,500.

Using a low frequency signal can lead to some problems, he admits. Power lines give off "white noise," a jumble of low frequencies which could interfere with the computer signals. Large metal objects or buildings could also distort the readings, and neighbouring farmers using the same frequency could inadvertantly confuse each other's computers. "Each system," says Mr. Baker, "will need its own licence and frequency."

A typical field as depicted by the Baker program; programmer Baker at his keyboard (below)



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